

AR7030 'DRM' custom receiver

DRM is a new type of DIGITAL AM transmission for the medium wave and short wave bands. The transmissions are already taking place on a regular basis, please refer to the DRM web site for full details (see below), transmit schedules are published on the Radio Netherlands web site.

For DRM evaluation by broadcasters, the Fraunhofer Institute in Germany modified the AR7030 to optimise it for DRM reception. The AR7030 was selected for the technical evaluation phase due to its excellent strong signal performance, low noise, good AGC characteristics, ease of adaptation and good price / performance balance.

This AR7030 has been custom modified to the Fraunhofer specification, this includes the 12kHz down-converter PCB. Note that **the modification populates the two filter option locations**, so that no additional bandwidths can be fitted unless others are removed first. An additional stereo 3.5mm jack plug is fitted to the rear panel of the AR7030 for connection to the sound card of a PC (mono or stereo screened lead will be fine, if using a single core cable assume the tip to be active and the main section of the plug to be ground). Fraunhofer software can be used to decode the DRM signal to readable audio. In addition, a modification has been added to the AR7030 to prevent EEPROM write while the radio is being powered up and down... **ideally you should switch the radio on first and off last**. This should prevent chances of EEPROM writes to the software if you forget to switch it off before the radio.

This unit has been custom manufactured and has been tested with DRM signals from bench test equipment AND FROM LIVE ON-AIR TRANSMISSIONS, so it definitely works! It has been calibrated after the DRM changes to filter-4 (ready for use).

If you do not have Fraunhofer software, you can download the VT Merlin distributed Fraunhofer software package from the DRMRX web site (about 13MB), it installs in conjunction with a key file which will be e-mailed to you upon payment of a licence fee of around EURO 60.00 (about US\$60 or £40) **visit <http://www.drmtx.org>** For further **general information**, please visit the AOR UK 'DRM PAGE' at <http://www.aoruk.com/drm.htm> The BBC R&D team have worked with Coding Technologies to produce a DSP internal PCB for the AR7030-DRM which provides demodulated DRM without the need for a computer, please see the AOR DRM page for information.

Fraunhofer professional software package: Includes RS232 support for the AR7030 so that the frequency may be controlled and has on-screen memories. Many additional features are provided for analysis and display. When launched, the software will script the correct parameters to the AR7030-DRM for DRM monitoring (AGC, filter selection etc). This allows the user to apply 'Auto' default settings to the radio which sets up all important radio settings (mode, filter, AGC, etc.). This provides a good starting point for reception. In addition to this, the filter, frequency and keylock can then be changed from the software.

VT Merlin software package: No RS232 support, just configuration of sound card is provided. A large tuning spectrum display is provided and is simple to operate, nothing to mess up! This is effectively a demodulator. As no control of the radio is present, all settings have to be set up manually. Suggested starting points for the radio are:

Mode; AM, Filter; 4 (displayed 6.6)
Whip amp; Off
RF-IF gain; RF + 00
AGC; Slow
Gain; 99%
PBS 0

Notes on configuration: Both types of software produce excellent results. In both cases, the 12kHz feed between radio and PC sound card is made with a 3.5mm to 3.5mm jack lead. It makes no difference if a mono or stereo type plug is used. During testing, it was found to be most convenient to use the sound card **mic' input** to allow some control over the input level. For the Fraunhofer software control of the radio, a communication lead is also required between an unused PC RS232 'com port' and the AR7030 radio 'remote' socket.

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A list of the Fraunhofer component changes are given here, see schematics:

Component description	Original value	New value
Filter X7	Not fitted	CFWM455D
Filter X8	Not fitted	CFWM455F
Filter X9	455G	CFWM455C
R51	1k5	1.0k
R52	1k5	1.0k
R70	2k2	1k2
R71	2k2	2.0k

- IF feed for the down converter PCB is taken from R78 (R77 side)
- Earth connection for down converter PCB is taken from R78 (earth side)
- Supply from J11 pin 3 **or** collector of Q70 **or** cathode of D50

12kHz IF output mixer circuit for DRM use with AR7030

